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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ARENT FOX KINTNER PLOTKIN & KAHN, PLLC
Suite 400
1050 Connecticut Avenue, N.W.
Washington, DC 20036-5339

EXAMINER

THOMAS, JAISON P

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 06/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/768,151	Applicant(s) OTSUKI ET AL.	
	Examiner Jaison P. Thomas	Art Unit 1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/04; 10/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 4 is objected to because of the following informalities: a ":" appears at the end of Claim 4. Applicant is suggested to replace ":" with a ---.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear in Formula (1) of Claim 1 whether applicant is indicating the attachment of two methyl groups to the unsulfonated aryl group (bottom one) or whether the unsulfonated aryl group is divalent in nature. For purposes of examination, and keeping with proper organic chemical nomenclature, the unsulfonated aryl group will be considered to have two methyl groups attached.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

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from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-3 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4 and 8 of Goto et al. (U.S. Patent No. 6,812,290). Although the conflicting claims are not identical, they are not patentably distinct from each other.

Goto et al. teaches a sulfonated polyarylene copolymer designed to be a proton conductive membrane wherein the copolymer is comprised of a unit (A) and a unit (B) wherein unit (A) has a structure according to formula (1) and unit (B) (Claim 1). Claim 4 discloses Formula (1), which comprises consists of a polyarylene structure wherein substituents R1-R16 can be selected from a group including hydrogen atoms and alkyl groups and X and X' represent divalent electron-withdrawing groups selected from a group disclosed (Column 21, lines 64-67).

Goto is relied upon as discussed above, however, Goto does not disclose the specific repeating structural unit structure as required by Formula (1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the sulfonic acid content, substituent organic groups and linking groups of the polymer of Goto through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). See also *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990), and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto et al (U.S. Patent No. 6,812,290).

Goto et al. teaches polyarylene copolymer designed to be a proton conductive membrane (Column 21, Claim 1) wherein the copolymer is comprised of a unit (A) and a unit (B) wherein unit (A) has a structure according to formula (1) and unit (B) has a structure according to formulae (2) - (4) (Cols. 3-4, lines 30-68 and lines 1-18

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respectively). Formula (1) consists of a polyarylene structure wherein substituents R1-R16 can be selected from a group including hydrogen atoms and alkyl groups (Column 3, lines 55-57). Further examples of the alkyl group include methyl and ethyl groups (Column 4, lines 33-34). Also, in Formula (1), X can be an electron withdrawing group selected from the group recited and includes a sulfone group (Column 3, lines 50-55). Further Goto teaches the sulfonation of the copolymer disclosed in the presence of a catalyst comprising a transitional metal compound and a sulfonation agent (Column 5, lines 9-16). The amount of sulfonic acid groups present in the polymer range from 1 to 5 meq per gram of polymer (Column 13, lines 34-38).

Goto is relied upon as discussed above, however, Goto does not disclose the specific repeating structural unit structure as required by Formula (1), the specific numbers of sulfonic acid groups present on the benzene ring or the use of the membrane in a membrane-electrode assembly or the use of the polymers disclosed in Claim 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Goto's membrane as sandwiched between electrodes since Goto teaches "(t)he sulfonated polymer shows excellent adhesion to substrates, and electrodes ..." (Column 21, lines 16-18). Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the sulfonic acid content, substituent organic groups and linking groups of the polymer of Goto through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the

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optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). See also *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990), and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

8. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura et al. (EP 1,348,716A1).

Yoshimura et al. teaches a polymer that can be used as a proton conductive membrane for use in fuel cells (Abstract) wherein the main chain is an aromatic polymer that can be selected from a group polyetherketones, polysulfone, polybenzimidazole (pg. 2, lines 35-38). Further the polymer can also be represented by the formula $-(A-Z)_m-(A'-Z')_n-$ (Formula (1), pg. 7, line 26) wherein "A represents a divalent aromatic group, A' represents a divalent aromatic group comprising a super strong acid group as a substituent, Z and Z' independently of one another represent a direct bond or a divalent group, m and n represent the number of repeating units, n is in the range of 10-100000 and the repeating units present in the number of n may be the same or different, and m is in the range of 0-100000 and the repeating units present in the number of m may be the same or different" (pg. 7, lines 28-32). The "super strong" acids referred above can include formulae (2a) to (2d) where G represents an alkylene group in which part or all of the hydrogen atoms are substituted with fluorine and W^+ can be represented by a hydrogen ion (pg. 2, lines 50-56 thru pg. 3, lines 1-13). The

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group A referred above can further be several different formulas (3a)-(3c) (pg. 7., lines 34-55 thru pg. 8, lines 1-8). Formula (3a) includes a substituent R_p wherein R_p can be an alkyl group of 1-6 carbon atoms and p can represent a number of 0-4 (pg. 8, lines 9-11).

Yoshimura et al. is relied upon as disclosed above, however, Yoshimura does not teach the specific structure as required by instant Claim 1, Formula (1), nor does it teach the specific sulfonic acid content as required by instant Claim 2 or the use of a membrane in a membrane-electrode assembly as required by instant Claim 4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the sulfonic acid content, substituent organic groups and linking groups of the polymer of Yoshimura through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). See also *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990), and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Further the use of proton conductive membranes positioned in between electrodes for fuel cell applications is notoriously well known in the art and does not patentably distinguish over the prior art of record.

9. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fox (US Patent No. 3,259,592).

Fox teaches a cation exchange resin which is a sulfonated polyphenylene ether (i.e. polyether) with a structure disclosed in Column 2, lines 4-8. The repeating structural unit has substituents Q, Q', and Q". Q is defined as being selected from a group including hydrogen and aliphatic hydrocarbon radicals and -SO₃H. Q' and Q" is defined as being selected from the same group as Q in addition to several other substituents (Column 2, lines 11-25). The patentee also notes that that it is not necessary that every ring in polymeric structure have the same substituents. "Controlled variation of the ring substituents provides a ready means to modify properties of the final resin or membrane" (Column 2, lines 35-42).

Fox is relied upon as disclosed above, however, Fox does not teach the specific structure as required by instant Claim 1, Formula (1), nor does it teach the specific sulfonic acid content as required by instant Claim 2 or the use of a membrane in a membrane-electrode assembly as required by instant Claim 4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the sulfonic acid content, substituent organic groups and linking groups of the polymer of Yoshimura through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205

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USPQ 215, 219 (CCPA 1980). See also *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990), and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Further the use of proton conductive membranes positioned in between electrodes for fuel cell applications is notoriously well known in the art and does not patentably distinguish over the prior art of record.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The references are considered cumulative to or less material than those discussed above.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jaison P. Thomas whose telephone number is (571) 272-8917. The examiner can normally be reached on Mon-Fri 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on (571) 272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JT
Jaison Thomas
Examiner
5/23/2006


Mark Kopec
Primary Examiner